

Rinse Water Control and Handling

Concrete & Masonry
Cleaning Basics

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Congratulations! You've worked hard to win the bid; your crews are on-site and ready to clean a concrete or masonry building. And then the owner, architect or general contractor asks "What about the rinse water? What's in it and how are you going to handle it?"

A wooden trough, lined with plastic and sheet metal, waits to catch runoff from paint stripping during a restoration cleaning project at the U.S. Capitol

Ideally, these questions were answered in the project specification stage so bidders knew what to expect. The rinse water question is not universal on every project; however, it is becoming increasingly common in environmentally conscious communities. This White Paper focuses on handling rinse water from typical new construction and restoration cleaning. It is a companion to PROSOCO's Technical Bulletin 200-CW: Controlled Handling of Cleaning Wastewater.

Solving rinse water issues calls for a team approach. Your first line of contact is the project team: owner's representatives, architects, and the general contractor and job-site managers. The team's goal is to negotiate environmentally responsible and cost-effective handling procedures. Your team most likely needs education and your cleaning product supplier should be a partner in the process. Depending on where the rinse water goes, the team expands to include local sewage system operators.

Where does the rinse water go and who controls it?

Where the rinse water goes determines who calls the shots on handling. Rinse water that soaks into soil is generally the owner's call. Discharges to a sanitary sewer are generally controlled by the receiving sewage treatment plant, also known as a Publically Owned Treatment Works (POTW). Discharges to a combined storm sewer generally are under municipal or county jurisdiction. Discharge to a storm sewer enters federal jurisdiction, although the United States Environmental Protection Agency (USEPA) usually passes responsibility to the state.

The politics of rinse water handling can be confusing and frustrating. All parties operate under basic federal rules, but the American system of government encourages local regulation and enforcement among roughly 3,000 counties and 25,000 cities, towns and villages.

All politics are local and the more local your contacts, the less complicated the process. Generally, local sewage plant operators are easier to work with than county or state agencies. Finding the right person can be difficult, especially in large metropolitan areas. For example, New York City operates one separate and thirteen combined POTWs.

Ultimately, the property owner is responsible for wastes generated by hired contractors. As a contractor, your goal is to help the team come to a common sense solution. Some owners will not let cleaners of any description touch their soil; that's okay if they are willing to pay

Rinse water Discharge Points

Soil:

Owner's property. Discharges may be regulated in areas with very porous soils and shallow drinking water sources.

Sanitary Sewer:

Goes to separate POTW. Includes most drains inside buildings.

Storm Sewer:

Goes to surface water such as stream, river or lake. Includes most exterior parking lot and street drains.

Combined Storm Sewer:

Exterior drain that goes to POTW. Uncommon and found in older cities.

additional contract costs. Many facility owners are subject to sanitary and stormwater permitting regulations. Universities, hi-tech, manufacturing and energy companies tend to be the most conservative because of their daily operations.

The most complicated option is discharge to a storm sewer. This generally requires state or federal permitting with very tight water quality limits. Technically, any business discharging to storm sewers is regulated. Be careful when a manufacturer claims their product is safe for discharge direct to storm sewers. They're not the ones subject to field enforcement.

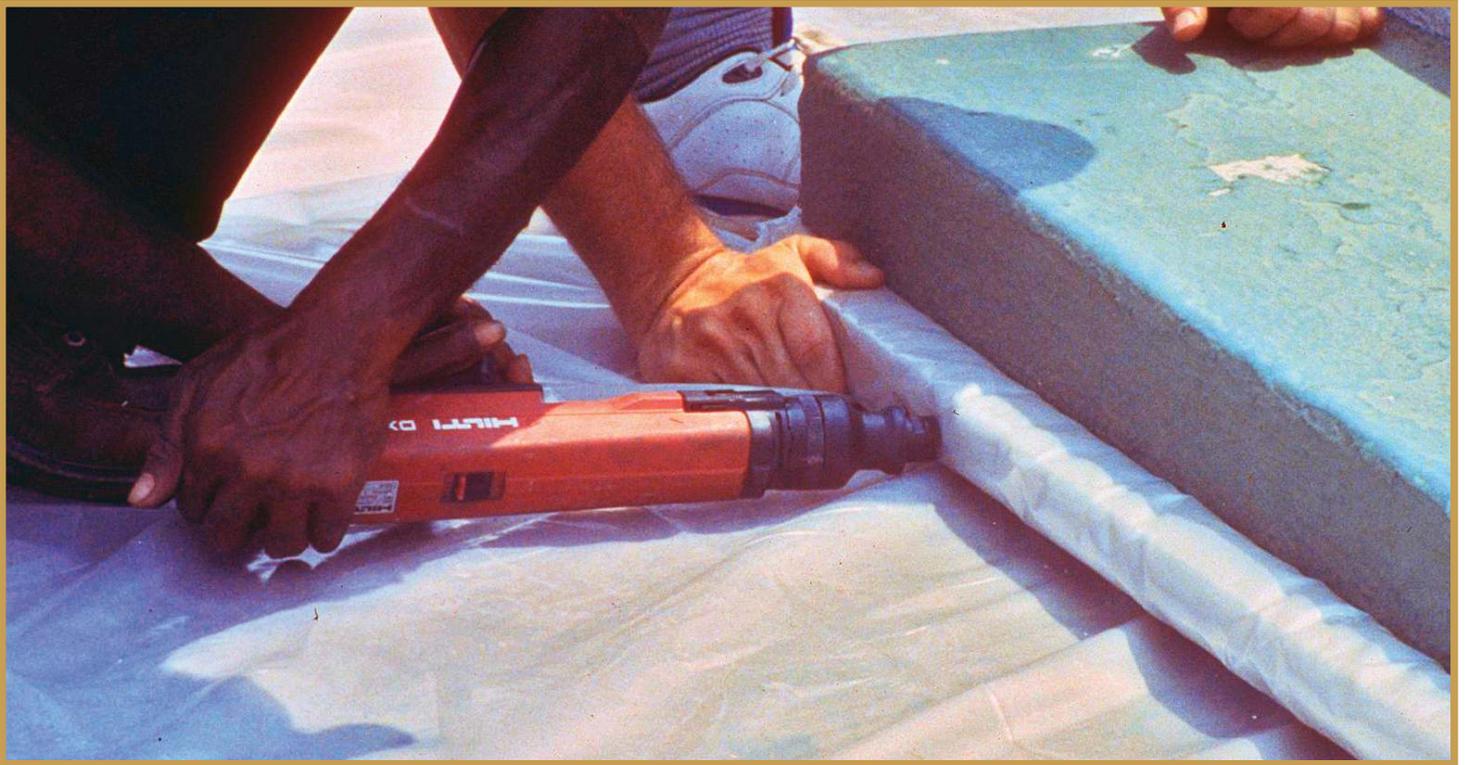
The simplest option for acidic, alkaline and biodegradable cleaners is allowing rinse water to soak into soil. This may require soil amendments to adjust pH and is not appropriate for solvents with toxicity or biodegradability issues. Desert communities are the most likely to restrict this option due to porous soil and shallow drinking water sources.

Dealing with combined storm sewers can be complicated. Typically found in older cities, local authorities sometimes don't even know where a particular drain goes. If it goes to a POTW, your contact there is generally called a Pretreatment Coordinator.

Collection and discharge to sanitary sewers obviously adds cost and complication, but is generally preferable to collection and paying for the rinse water to be hauled away for disposal. The pH level of the discharge is the primary issue with the majority of new construction and restoration cleaners. Discharge of solvent-based strippers and



A wooden trough, lined with plastic and sheet metal, waits to catch runoff from paint stripping during a restoration cleaning project at the U.S. Capitol



Technicians nail wood and plastic to concrete steps as they make a dam to collect runoff from an upcoming paint-stripping operation at Legion Field stadium in Birmingham, Ala.

degreasers is more complicated.

Get all your information together before starting discussions with the building team. You'll need product data and MSDS at minimum. Contact your area representative or go to www.prosoco.com. Do some rough math on the amount of rinse water generated per gallon of applied product. Everyone needs to understand that you aren't just opening a container and dumping it on the ground. Water dilution ratios of up to 200:1 are typical after application and rinsing. Gathering pH data while doing test panels is particularly helpful.

What's in the rinse water?

Formulators create chemical blends for function, compatibility and cost. Sometimes the cheapest cleaner has hidden costs on the disposal side. PROSOCO has a fundamental "do no harm" philosophy. A cleaner that etches or discolors the substrate isn't worth much. Concrete and masonry substrates and assemblies are complex – stick with suppliers you can trust and always test to determine suitability, application rates and dwell time.

Selection of the right product for the task at hand often minimizes rinse water issues without compromising performance. From a rinse water perspective, the cheapest or fastest product isn't always the best choice. PROSOCO's Customer Care department and sales representatives can help you choose a range of cleaners for side-by-side testing.

Acidic and Alkaline Cleaners

The majority of concrete and masonry cleaners incorporate acidic or basic/alkaline chemicals. The chemistry of cement makes an acid-free mortar remover a physical impossibility. The terms "acidic" and "basic" refer to the low and high range of pH as measured with portable meters or test strips. A pH of 7 is neutral (water); lower is acidic (lemon juice) and higher is basic or alkaline (lye). For rinse water disposal

purposes, the goal is to achieve a pH range acceptable for a given discharge point.

Concentrated acidic and alkaline chemicals require careful handling to prevent employee injury or environmental harm. However, after use they degrade to elemental components found in nature. Neutralization balances pH and creates generally inert chemical substances. Acids chemically react with bases to form neutral salts. Hydrochloric acid found in new masonry cleaners reacts with calcium carbonate in excess mortar and makes a calcium chloride (sea salt) solution. Hydrofluoric acid in restoration cleaners reacts with calcium sources to form inert calcium fluoride. Sodium hydroxide cleaners for carbonate stone (Sure Klean® 766 Limestone and Masonry Prewash) react with acetic acid neutralizing rinses (Sure Klean® Limestone and Masonry Afterwash) to form sodium acetate salts. Potassium hydroxide paint strippers and their neutralizing rinses have similar chemical neutralization reactions.

Rinse water pH isn't always predictable and varies due to a number of factors, including coverage rate, concentrate dilution, rinse dilution and reaction with soiling and the substrate. It can be adjusted by adding straight lime or baking soda to soil, or adding aqueous solutions to captured rinse water. Baking soda (sodium bicarbonate) is often preferable as it won't bump the pH too high or too low and neutralizes both acids and bases. The pH target for sanitary drains is generally 5.5-10.5 and is set by the POTW. In new construction, landscapers usually fine tune pH after topsoil is replaced and before planting. In some cases you can neutralize product on the wall with a baking soda solution. Always test for adverse effects.

Some acid and alkaline cleaners are relatively weak and require less dilution or neutralization to achieve the target pH. The weaker acids include citric, phosphoric, lactic, glycolic and dilute acetic acids found in Sure Klean® Light Duty Concrete Cleaner and Light Duty Restoration Cleaner. Buffered acidic formulations offer cleaning power with less lower odor or less potential to damage non-masonry substrates. While Enviro Klean® Safety Klean and SafEtch® are based on acidic

organic salts, they feature low odor and are not damaging to skin or common architectural metals. Light Duty Restoration Cleaner has a pH in the range of cola soft drinks. Enviro Klean® EK Restoration Cleaner is a buffered solution with a pH near the lower end of what is acceptable for discharge to a sanitary sewer.

Concrete and masonry surfaces are porous and require thorough rinsing to remove cleaner residues and avoid unwanted reactions with the substrates or subsequent coatings or protective treatments. This is especially true with ammonium bifluoride (ABF) based cleaners whether provided as a powder for field dilution or as a ready-to-use liquid concentrate. Some ABF cleaners are very concentrated and use can liberate free fluoride that is potentially damaging to glass and or other architectural substrates.

Solvent-Based Cleaners and Paint Removers

Solvent chemistry carries a different set of issues. From a rinse water perspective, solvents are judged in terms of toxicity, biodegradability and whether they are subject to specific water quality or hazardous waste regulations. Solvent discharge is fundamentally complicated as each factor varies depending on the chemical, concentration and discharge point. A non-chlorinated solvent at low concentrations in an alkaline paint stripper may be alright for discharge to soil or the sanitary sewer after use, but at higher concentrations may be unacceptable. Solvents generally cannot be neutralized; they either have good intrinsic properties or don't.

Chlorinated solvents – such as methylene chloride – are highly regulated. Many users prefer methylene chloride paint removers such as Sure Klean® Fast Acting Paint Stripper for their power, speed and relative low cost. Unfortunately, these

Baking Soda Acid and Alkaline Neutralization Byproducts and Common Uses

Hydrochloric acid yields Sodium chloride (table salt)

Hydrofluoric acid yields Sodium fluoride (for cavity prevention)

Phosphoric acid yields Sodium phosphate (leavening agent)

Citric acid yields Sodium citrate (food additive)

Acetic acid yields Sodium acetate (food seasoning)

Glycolic acid yields Sodium acetate (food seasoning)

Potassium hydroxide yields Potassium carbonate (food and soap component)

products carry hidden costs. Products with over 10% methylene chloride are classified as hazardous waste by the USEPA. In this case, regulations extend to every drop of water generated during use. That means it would need to be hauled away by a licensed hazardous waste Treatment, Disposal and Storage (TSD) company. A user evaporating hazardous waste or hauling it to a different location technically violates USEPA regulations.

Environmentally preferable solvent-based paint, graffiti and oil removers typically contain readily biodegradable solvents such as benzyl alcohol, propylene carbonate and soy methyl esters. Enviro Klean® SafStrip®, SafStrip® 8 and Defacer Eraser® Graffiti Wipe are based on these solvent systems. They are more expensive and generally require longer dwell times. Do not expect them to work on two-part epoxies, but they'll do fine on everything else – with fewer disposal headaches.

Alkaline paint strippers like Sure Klean® Heavy Duty Paint Stripper are also a valid option. They excel at removing heavy paint buildup but require neutralization of porous substrates after use. The pH issues



A plastic sheeting dam catches the run-off as a technician pressure rinses dissolved paint and spent paint stripper from masonry at Legion Field stadium in Birmingham, Ala.



Scaffolding holds up the back end of a plastic sheeting dam to collect paint stripping runoff during paint stripping operations at Legion Field stadium in Birmingham, Ala.

are the same as with new masonry cleaners. If you capture alkaline stripper rinse water, combine it with the acidic afterwash to help adjust pH. Some alkaline paint strippers, such as Sure Klean® Heavy Duty Paint Stripper D, contain chlorinated solvent components that may have disposal restrictions. Always follow the Product Data Sheet and label application instructions and try multiple paint or graffiti remover formulations during the test panel phase of your project.

Paint and oil removal can cause other discharge and USEPA waste issues. POTWs usually have strict limits on heavy metals found in lead-based paint and machine oils. USEPA regulates some toxics at extremely low concentrations. Ask questions prior to bidding to avoid expensive post cleaning disposal.

Surfactant- and Oxidizer-Based Cleaners

The science and technology of concrete and masonry cleaning is full of surprises. One of those surprises has been the level of effectiveness of non-acidic cleaners in removing dark soiling from concrete and masonry substrates. Not too long ago, users would have turned to acidic cleaners that are effective on carbon buildup. It turns out that much of that dark soiling is biological and responds well to surfactant-based cleaners like Enviro Klean® 2010 All Surface Cleaner or Enviro Klean® BioWash®. Surfactant-based cleaners are a good choice where rinse water options are limited or pH management is an issue.

PROSOCO utilizes concentrated peroxide oxidizer

in Enviro Klean® BioKlean™ Activator to add extra punch to the alkaline Enviro Klean® BioKlean™ Cleaner for removing heavy biological soiling. This is the preferred combination for cleaning after vine removal or where a wall is covered in slime. Once diluted, peroxide has little environmental impact. Combine the system rinse water with the neutralizing Sure Klean® Limestone & Masonry Afterwash rinse water to help get to a discharge-acceptable pH level.

Product Purity and Quality Control

Formulators have a range of options for raw material grades. In general, lower grade materials cost less because of varying strength and contaminant loading from lot to lot. Generic muriatic acid is most often the cheapest variety available and is a waste byproduct from

steel pickling operations. If the wholesale or formulated material is yellow or brown or has small bits of grit floating in it, this is usually an indication a waste material is present. There is generally no guarantee acid strength will be consistent from container to container. Coloration comes from iron, nickel, chromium, mercury and arsenic among other contaminants that can precipitate out during cleaning and permanently discolor the surface. The lowest grades

“Ultimate Biodegradation”

Definition from U.S. EPA:

Ultimate biodegradation (aerobic) is the level of degradation achieved when the test compound is totally utilized by microorganisms resulting in the production of carbon dioxide, water, mineral salts, and new microbial cellular constituents

of muriatic acid can add excess metals to rinse water during cleaning.

PROSOCO utilizes technical and food grade raw materials and maintains tight quality control standards on every batch produced and packaged. This assures consistency from container to container for predictable cleaning results without damaging the substrate or mortar joints. PROSOCO cleaners contain none of the metals present in generic muriatic acid that have potential to stain the substrate or cause environmental contamination.

Biodegradability

For a chemical or substance to be biodegradable, it must be capable of being broken down into its primary constituents in the environment. An organic solvent, surfactant, or paper based package can be biodegradable. A neutralized mineral acid or mineral alkaline chemical like hydrochloric acid or sodium hydroxide becomes a mineral salt. It cannot be degraded further as it is already a primary constituent.



Permitting and Handling

The need for discharge permitting is always a tricky question and depends on local rules. You can count on needing a permit if the discharge is to a storm sewer or if your project overhangs surface water. Highly regulated facilities may have operative stormwater permits that call for controlling discharges to soil or the sanitary sewer. If you're working on a high-profile project, permitting and additional scrutiny are more likely.

Some discharges to sanitary drains require permits and some don't. POTW wastewater pretreatment programs were primarily created for fixed, operational facilities. Every program deals with construction projects differently. It's rare that they'll actually require a permit, but they will want to see your handling procedures and discharge testing documentation. Train your employees and have them keep a written log.

For large projects where containment and pretreatment are required, set up a good containment, transfer and neutralization system. You may

spend some money on materials and equipment, but you'll make it up in labor costs. Neutralization can be a frustrating process and is best carried out in something larger than a 55-gallon drum.

Conclusion

Like anything else in new construction and restoration projects, communication is the key to successfully navigating through rinse water handling problems/issues. If you form a good partnership during the specification stage, you'll know what to expect when it comes time to bid the project. It won't eliminate all of your headaches, but you'll provide a quality service and keep your company in the black.

Containment and Treatment Tips and Tricks

These ideas come from leading commercial contractors:

- To minimize wind drift and the width of containment, pre-rinse the wall before pressure washing so the cleaner runs down the wall.
- Always apply cleaner with a low-pressure sprayer and avoid atomization. Brush apply where appropriate.
- When working next to water, add screen mesh around the work platform to coalesce fine mists.
- In densely populated areas, work at night to minimize traffic and wind drift concerns.
- For containment on brick or block structures, grind out a lower joint to provide an anchor point for a plastic liner. Adhere with painter's caulk for easy removal later on.
- If you have a pedestrian shed over a sidewalk, cover the top and turn it into a containment system.
- Always use two layers of Visqueen to avoid leakage. Use dimensional lumber to create a frame for your temporary containment.
- For rinse water transfer, use debris tolerant diaphragm pumps and screen strainers.
- Larger neutralization batches take less labor. Agricultural tanks or totes are inexpensive and easily obtained.
- Use pH test strips from a pool and spa supply or order from a laboratory supply company

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